Introduction

Aquatic Invasive Species That Threaten Utah

Aquatic invasive species (AIS) are not strangers to Utah. In fact, numerous AIS species now inhabit Utah or threaten the state with immediate arrival. The list includes pathogens, fungi, algae, plants, mollusks, crustaceans, fish, amphibians and reptiles (Appendix A). Some have been present almost since the initial arrival of the pioneers to Utah in the mid 1800s, and the numbers of different species, their abundance, and their distribution seems to be on a constant march upward. AIS are defined as water-associated non-native plant and animal species that threaten the diversity or abundance of native species due to their uncontrollable population growth, causing ecological instability of infested waters, or economic damage to commercial, agricultural, aquacultural, or recreational activities dependent on such waters. The term AIS in many documents and laws is referenced as Aquatic Nuisance Species; for purposes of this plan both aquatic invasive species and aquatic nuisance species mean the same thing.

AIS are defined in part as non-native. However, not all non-native species are viewed as a nuisance, since many are not invasive. Some non-native species support human livelihoods or a preferred quality of life, although they can in some situations have adverse impacts on desired species (e.g. sport fish impacts on sensitive species).

Populations of AIS all over North America have expanded, spreading rapidly due to lack of natural controls, and their ability to adapt to a variety of habitats. AIS are known to cause significant ecological and socio-economic problems throughout the world. Just within North America, populations of AIS, such as *Dreissenid* mussel species (quagga mussel *Dreissena bugensis,* zebra mussel *Dreissena polymorpha*, dark falsemussel *Mytilopsis leucophaeta)*, New Zealand mudsnail *Potamopyrgus antipodarum*, Eurasian watermilfoil *Myriophyllum spicatum*, and parasites or diseases that attack aquatic animals, are increasing in prevalence. These and other AIS species either exist or are threatening to arrive in North America, and many will eventually threaten Utah, too.

Why Manage Aquatic Invasive Species in Utah

AIS are simply bad for Utah's environment and economy for a multitude of reasons. AIS challenge our native species, resulting in additional predation, out-competing them for food, displacing them from natural habitats or infecting them with disease. AIS obstruct flow in waterways, impacting municipal, industrial, and irrigation water supply delivery. AIS degrade ecosystems, reducing or threatening recreational or commercial fishing opportunities. And, AIS can cause wildlife and public health problems. These reasons are not all-inclusive, but alone they give cause for serious concern and need for aggressive management.

For Utah, the concern about AIS increased dramatically in the early 1990s with the arrival of Whirling Disease. Then, the alarm rang loudly when quagga mussels were discovered in Lake Mead, Nevada during January 2007. Soon thereafter the Utah Department of Natural Resources began an assessment of threats to Utah by *Dreissenid* mussels, and put policy NR-07-D-11 (Appendix B) into effect to prevent invasion of

Dreissenid mussels into Utah's waters. The policy assigned the Utah Division of Wildlife Resources as lead agency within Utah to carryout such a program. Concurrently, Utah Division of Wildlife Resources implemented a Quagga Mussel Education and Implementation Plan (Appendix C) for purposes of informing the public about threats and impacts from a *Dreissenid* mussel infestation. A specific target for outreach was decision makers who had authority to make funds available for plan implementation. The plan would also facilitate interdiction of watercraft transporting AIS, leading to decontamination of infested boats and equipment.

These latest efforts were not Utah's first steps at AIS management, but they certainly represented a rapidly changing attitude that AIS, particularly the *Dreissenid* mussel threat, would require a focused, well funded effort to achieve satisfactory management results. Prior to 2007, the Utah Division of Wildlife Resources only committed a small portion of one staff person's time to the AIS problem, although biologists statewide occasionally directed their efforts toward specific local issues. Utah Division of Wildlife Resources' Fish Experiment Station in Logan, Utah for decades has provided strong, national leadership in the fight against aquatic pathogens and innovations in fish culture. Universities, tribal, federal, state and local government agencies, including private interests and organized sportsman groups in Utah also have on occasion directed some effort toward different AIS problems. And, the Utah Department of Agriculture and Food's Fish Health Board is the lead agency endeavoring to regulate aquatic animal and pathogen movement into and within Utah.

Eurasian watermilfoil during the early to mid 1990s became established in northern Utah's Mantua Reservoir and southern Utah's Fish Lake; it's spreading primarily due to recreational boats. New Zealand mudsnail populations also seemed to proliferate all over the state during the mid 2000s, possibly moving through irrigation systems and on the soles of angler's felt-soled waders. However, the growing threat from a discovered, but well established quagga mussel population during early 2007 in the lower Colorado River drainage spurred the State of Utah to an accelerated level of action. It was the "straw that broke the camel's back."

Also in late 2007 a population of New Zealand mudsnail was found in southern Utah's Loa State Fish Hatchery, causing it to be quarantined. A New Zealand mudsnail management plan for the hatchery was written, implemented, and decontamination is underway (Appendix D). New Zealand mudsnail have since been discovered in early 2008 on the grounds of central Utah's Midway State Hatchery; fortunately mudsnails are not yet inside the hatchery facilities. (**Note:** Individual hatchery Hazard Analysis Critical Control Point plans are in place for every state hatchery.) Thus, threats and impacts from the multitude of AIS already in the state, not to mention those on their way, are fully recognized as needing more attention.

Again, the AIS problem increased in late 2007 when a population of zebra mussel was found in Pueblo Reservoir in south-central Colorado. Also in 2007 zebra mussels were discovered in San Justo Reservoir in central California. 2008 resulted in discovery of quagga and zebra mussels in the headwaters (Lake Granby, Grand Lake, Shadow

Mountain Reservoir and Willow Creek Reservoir) of the Colorado River in Rocky Mountain National Park, Colorado. And, the determination in late 2008 that zebra mussel have already infested Utah's Electric Lake in Emery County was a devastating discovery.

What's at Stake in Utah--Economic and Ecologic Impacts

Degradation by AIS of Utah's aquatic wildlife resources (species, habitats and water-based recreation areas) may well imperil not only those resources, but the economy of local communities in the state. Certainly, the compromising of sensitive species in Utah by AIS could lead to additional listings under the Endangered Species Act, which represents a failing for individual species' population health and welfare. Such action has the potential to hamper economic development in local communities, since compliance with conservation actions driven by the Endangered Species Act can be mandated. Sometimes compliance is costly, nonetheless important and needed, but it is not uncommon for development plans to be delayed or altered in order to meet Endangered Species Act compliance.

Additionally, anglers who fished in Utah since 1995, including anglers across the nation over the last two decades, have shown a propensity to redirect their recreational endeavors to something other than fishing when inconvenienced by difficult regulations, poor success, poor quality fish, or an unpleasant fishing experience (Dalton 2003 and 2005; U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 1991, 1996, 2001 and 2006). *Dreissenid* mussels and other AIS will lead to all of those situations. Once anglers quit the sport, it is very difficult to get them to return, which is evidenced by a slight decrease in fishing license sales in Utah. Aquatic conservation by the Utah Division of Wildlife Resources is mostly funded by angler's purchase of fishing licenses and angler associated federal aid to the state. Expenditure by the 375,311 anglers who fished in Utah during 2006 for goods and services that supported their angling efforts exceeded $708 million, supporting more than 7,000 jobs in Utah's communities (Southwick Associates, Inc. 2007).

Boating in Utah during 2006 was less than in 1999. The Institute for Outdoor Recreation and Tourism at Utah State University in a 2007 report for Utah State Parks and Recreation, showed 76,000 registered boats in Utah during 2006. Those numbers are a surprising increase of 800 over the previous year. The increase is notable in view of a long-term decline, since the acreage of water available for boating remains relatively constant in Utah. AIS impacts to boaters may further reduce their participation at lakes and reservoirs that become infested, since the boater's favorite lakes are those with quality fishing. For example, *Dreissenid* mussels can plug the water circulation system in boats, causing engines to overheat and become seriously damaged. Eurasian watermilfoil restricts boat use, particularly in the near shore zones. And, more mandatory decontamination protocols are being imposed, so boaters don't inadvertently move AIS while transporting their watercraft between recreation areas. It is estimated that lost revenue in Utah's communities due to decreases in boating could be substantial. Utah boaters annually expend at least $276 million for goods and services supporting their sport, which supports more than 4,300 jobs statewide (Harris 2008).

The two decade long history of *Dreissenid* mussels fouling water conveyance systems just in North America is well documented (O'Neill 1996). Expenditures for maintenance have been significant, with the infested areas spending nearly $100 million per year. *Dreissenid*'s spread across Europe outside their native range has caused similar economic challenges (O'Neill, 1996). No doubt, impacts from *Dreissenid* mussels and other AIS represent real threats to Utah's economy and could alter all Utahan's quality of life. The Utah Division of Water Resources has estimated based upon maintenance expenditures east of the 100th Meridian, that cost to Utah on an annual basis due to infestation by just *Dreissenids* could exceed $15 million (Pers. Comm. Mike Suflita. 2007. Senior Engineer, Utah Division of Water Resources). That estimate did not include maintenance cost to Utah's 1,200 miles of major pipelines or the vast system of secondary pipelines and irrigation systems within the state, nor Utah's 4,500 miles of canal.

Laws That Govern AIS Management

The following is a list and short summary of the primary laws that govern the control of AIS on a national basis as it affects Utah. Included are Utah laws.

National AIS Laws

1973 Endangered Species Act: The U.S. Fish and Wildlife Service administer the Endangered Species Act as part of its authority to affect AIS impacts that could extend to a listed species or listed critical habitat. The act, which is Public Law 93-205, has experienced several amendments across the years, and at its onset repealed the Endangered Species Conservation Act of 1969. The 1969 Act had amended the Endangered Species Preservation Act of 1966.

1990 Nonindigenous Aquatic Nuisance Prevention and Control Act: Due to the multitude of environmental and socio-economic impacts posed by AIS, many governmental and non-governmental entities have recognized need for regulation. In 1990 the Nonindigenous Aquatic Nuisance Prevention and Control Act was passed by Congress and enacted to address AIS problems in the United States, particularly in the Great Lakes. This legislation provided federal cost-share support for implementation of state AIS plans. The 1990 act established the national Aquatic Nuisance Species Task Force, which is co-chaired by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration.

1996 National Invasive Species Act: The reauthorization of the aforementioned Nonindigenous Aquatic Nuisance Prevention and Control Act occurred in 1996 as the National Invasive Species Act. It established a national goal of preventing new aquatic nuisance species introductions and limiting the dispersal of existing AIS in all of the states. The National Invasive Species Act also specified that state AIS plans identify feasible, cost-effective management practices and measures that can be implemented by states to prevent and control AIS infestations in a manner that is environmentally sound.

The 1996 National Invasive Species Act established six Regional Panels across the nation to serve as advisory committees to the national Aquatic Nuisance Species Task Force.

Utah's Governor appointed Utah Division of Wildlife Resources to represent Utah as a member on the Western Regional Panel, which is chaired by the U.S Fish and Wildlife Service.

Additionally, the 1996 act authorized the 100th Meridian Initiative as an effort to keep *Dreissenid* mussels east of the 100th Meridian. The initiative resulted in five River Basin Teams. Utah Division of Wildlife Resources is Utah's member on the 100th Meridian's Colorado River Basin Team.

The 1996 National Invasive Species Act directed the U.S. Coast Guard to establish regulations and guidelines to control the introductions of AIS via ballast water discharge into waters of the United States. It also directed the U.S. Army Corps of Engineers to develop a program for research and technology to control *Dreissenid* mussels and to make information available on control methods.

Executive Orders: The 1999 the Executive Order 13112 on Invasive Species established the national Invasive Species Council (Secretaries of State, Treasury, Defense, Interior, Agriculture, Commerce, Transportation, and the Administrator of the Environmental Protection Agency). Its purpose is to oversee activities of existing federal organizations that address invasive species issues in order to increase public awareness, coordinate federal and state activities, provide technical assistance and research, and prevent importation of nuisance species.

2008 Lacey Act: The U.S. Fish and Wildlife Service, amongst other agencies, administer the Lacey Act, which is Public Law 110-246, as part of their authority to prohibit trade in wildlife, fish, and plants that have been illegally taken, possessed, transported or sold. The act, originally passed in 1900, has been amended several times; the most significant ones occurred in 1969, 1981, 1988 and 2008. The act further regulates activities involving specified species deemed to be injurious to the United States.

Other Federal Activity That Relate to AIS Management: Many other federal acts and agencies in-part focus upon AIS management. The following actions and laws have significance to Utah.

> The Bureau of Reclamation administers a small, but significant acreage in Utah as "withdrawals" from other federal land management agencies for purposes of managing water development projects. They exercise AIS management on those properties. And, the Upper Colorado River Regional Office for the Bureau of Reclamation is currently preparing a management plan that focuses upon AIS management.
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> The Clean Water Act, administered by the Environmental Protection Agency, strives to eliminate introduction of toxic substances into waters of the United States to ensure that surface waters are suitable for human sports and recreation. Additionally the Clean Water Act regulates discharge of dredge and fill materials into wetlands;

enforcement as it relates to wetlands is coordinated by the U.S. Army Corps of Engineers.

The Plant Protection Act, administered by the U.S. Department of Agriculture Animal and Plant Health Inspection Service, prohibits introduction and dissemination of plant pests and noxious weeds.

The National Forest Management Act, the Federal Land Policy Management Act, and the National Park Act, administered by the U.S. Forest Service, Bureau of Land Management, and National Park Service, respectively, regulate native species, non-indigenous species introductions and habitat health on most of the federal land in Utah.

The Central Utah Project Completion Act, administered by the Utah Reclamation, Mitigation Conservation Commission, besides providing for the completion of the Central Utah Project and maintenance of its facilities, affords enormous mitigation opportunity and perpetual funding for either unrecognized impacts or a continuation of mitigations for wildlife impacts.

The Farm Bill, administered by the Natural Resources Conservation Service, working in close partnership with Utah's Association of Conservation Districts, strives to improve private agricultural lands for wildlife habitat and agricultural purposes. In part, they target management of AIS as they affect production of crops or product from private land.
Note: the Natural Resources Conservation Service manages the National Invasive Species Information Center (www.invasivespeciesinfo.gov).

Several Native American tribes--Navajo, Northern Ute, White Mountain Ute, Northern Goshute, Southern Goshute, Paiute, Shoshone--exist or have hunting and fishing rights within Utah. The Ute Tribe and the Navajo Tribe each control significant areas (e.g. the Navajo Nation borders most of the southern border of Lake Powell and the Ute Nation includes several boating waters) with potential for infestation by AIS, particularly *Dreissenid* mussels. The other tribes have limited resources at risk where AIS could become an issue. The tribes under treaty with the United States maintain absolute authority for resource management on their lands, but are advised by the U.S. Fish and Wildlife Service concerning wildlife management issues.

Several international agreements also afford protection from AIS for the United States.

Utah Laws That Relate to AIS
Utah Code, section 23, establishes Utah Division of Wildlife Resources as the authority for wildlife management in the state, but the authority only extends to species defined as "protected wildlife." Thus, neither Utah Code nor associated rule provides authority for the management of plant species by Utah Division of Wildlife Resources, including those plant species recognized as AIS. Chapters 13 through 27 of section 23 in the Utah Code and an array of associated Utah Rules address wildlife management issues regarding

protection, management, take, possession, importation and exportation of protected wildlife, which includes quagga and zebra mussel considerations, making them prohibited species. Chapter 27 is the codification of the Aquatic Invasive Species Act (Appendix E1), and authority for enforcement of the Act is facilitated by Rule R657-60, Aquatic Invasive Species Interdiction (Appendix E2). The Act and Rule only consider *Dreissenid* species, providing greater authority for Utah to interdict watercraft and equipment or inspect waters infested with *Dreissenid* mussels. Utah Division of Wildlife Resources, Utah Peace Officers (includes Utah State Park and Recreation rangers), and Utah Port of Entry Agents now have authority to inspect equipment to determine contamination by *Dreissenid* mussels, particularly equipment that has been at any infested waters within the last 30 days. The authority extends to compelling decontamination as necessary. Additionally the authority allows closure of infested water bodies until the operator has developed a satisfactory plan to control and eradicate *Dreissenid* mussels.

Utah Code [4-2-2L (definitions 4-17 and 4-36-1)] provides the Utah Department of Agriculture and Food authority over noxious weeds, some of which are AIS. Management of AIS plant species in Utah results from interagency cooperation, exercising other agency's or private land owner's authority. Most AIS plant associated management activity in Utah involves cooperative arrangements between Utah Department of Agriculture and Food, Utah Division of Wildlife Resources, and Utah Division of State Lands and Forestry, State Institutional Trust Lands Administration, Utah State Parks and Recreation, along with the aforementioned federal land management and conservation agencies.

Utah Code [72-9-502 (definition 4-1-8)] and Rule R58-1-16(C) requires that all vehicles importing aquatic animals into Utah or through Utah must have documentation (Livestock & Fish Movement Report). Imported aquatic animals and their documentation are subject to inspection either at Utah ports of entry or at Utah Department of Agriculture and Food offices; entry denial, fines, or other action may occur. The Utah Department of Agriculture and Food works cooperatively on aquatic animal importation and transportation with the Utah Division of Wildlife Resources and the Utah Department of Health under a memorandum of understanding. Utah Department of Agriculture and Food provides standards for importation of aquatic wildlife for aquaculture, control of depredating aquatic animals, enforcement of rules, prevention of disease, and spread of disease among and from imported aquatic animals, and regulatory decisions for suspect disease endangerment in fish. They also through the Fish Health Program regulate entry permits for all national and international importations of aquatic animals for aquaculture purposes into Utah. Utah Division of Wildlife Resource and Utah Department of Agriculture and Food work cooperatively to grant health approvals for imported aquatic animals. This oversight extends to federal, state and private aquaculture facilities. And, because live fish (and water) are imported, the fish health approval process is completed for each aquaculture facility on an annual basis. The approval process includes review of current status of AIS at each facility, AIS proximity to each facility, and AIS proximity to export locations. The applicant is required to follow certain procedures to treat, test, or remove AIS from the fish and the water.

Importation of ornamental fish, including those deemed to be AIS, are not effectively regulated, but if the Utah Department of Agriculture and Food or the Utah Division of Wildlife Resources determines that an introduction of ornamental fish poses a disease risk for aquatic animals, then existing rules may be the vehicle to regulate the private ornamental fish industry to protect against AIS. The spring viremia of carp virus is now applied as needed to ornamental fish.

Additionally, certain "emergency prohibited" and "prohibited" pathogens fit the definition of AIS--viral hemorrhagic septicemia, whirling disease, Asian tapeworm (*Bothriocephalus acheilognathi*), and the trematode *Centrocestus formosanus*. Utah Department of Agriculture and Food requires treatment or testing of all proposed imports that could be host species or carriers or even susceptible hosts of these pathogens. (Note: The Asian tapeworm host list is attached as Appendix F.) In the unfortunate event of an aquaculture facility becoming infested by AIS, quarantine may be imposed where it is reasonably necessary to protect aquatic animals within the state. Release of any live or dead imported aquatic animal into public waters is illegal.

The Utah Code (17B-1-103 and 17B-2a-1003) establishes Water Conservancy Districts as political subdivisions of the State of Utah to develop water supplies for their service areas. They are primarily a wholesaler of water to other agencies (cities), and they own and operate a multitude of water storage, treatment and delivery facilities, some of which are major recreation reservoirs and State Parks. The Water Conservancy Districts have authority to protect and maintain their facilities in face of an AIS threat.

Other Efforts to Facilitate AIS Management

Utah Division of Wildlife Resources as a member of the Colorado River Fish and Wildlife Council, the Association of Fish and Wildlife Agencies and the Western Association of Fish and Wildlife Agencies is in constant contact with a multitude of international and national wildlife management agencies and other interested publics attempting to deal with AIS. These groups are regularly stimulated to become more aggressive by the national Aquatic Nuisance Species Task Force, who is proposing that the Western Governors Association meeting in 2008 include the topic of AIS in order to bring more focus on AIS issues from the top administrative office in the various states of the west. Previously in 1998 and 2005, the Western Governors Association passed resolutions 98-018 and 05-11 dealing with "Undesirable Aquatic and Terrestrial Species" and "Undesirable, Invasive Aquatic and Riparian Species," respectively. The Utah Department of Natural Resources already has strong support from the Utah Governor's office and the Utah legislature. The Utah Department of Natural Resources has urged Utah's governor to stimulate other western governors to more fully and aggressively deal with AIS.

Additionally, Utah Division of Wildlife Resources has taken a lead role in the west for initiating an AIS program with significant gubernatorial and legislative support for program budget. As a result, an array of western states have been in constant contact, seeking advice about "how did Utah do it." The Utah Division of Wildlife Resources has shared process and outreach product with an array of western and other states. Regarding

the states that surround Utah, Idaho already has an approved AIS plan; Colorado is in the process of preparing a plan; New Mexico is showing progress toward an AIS plan; Nevada and Arizona, also have approved AIS plans. Unfortunately, Wyoming seems to not be doing much, although Wyoming shares Flaming Gorge Reservoir with Utah—the reservoir is at great risk for infestation by *Dreissenid* mussels.